

REMARKS

Claims 1-38 remain in the application. Reexamination and reconsideration of the claims in view of the following remarks is respectfully requested.

Claims 1-3, 5-7 and 9-32 were rejected under 35 U.S.C. 102(e) as being anticipated by Shirasaki (USP 6,185,040). This rejection is respectfully traversed.

Claims 1-3, 5-7 and 9-32 are directed to an invention comprising a number of elements in combination. For example, representative claim 1 is directed to a transmitting system comprising a combination including a processor, an integration lens and an optical fiber. The claimed processor processes a collimated input beam which has been modulated with a data signal to produce multiple time-delayed output beams. The multiple time-delayed output beams are spatially distributed and independently phase shifted. The integration lens receives the phase modulated output beams and reintegrates the phase modulated output beams into a single encoded beam with a time series chip sequence. The optical fiber receives the integrated encoded beam from the integration lens and transmits the integrated encoded beam.

The combination of elements defined by representative claim 1 requires that the input beam entering the processor must be collimated, such that the multiple time-delayed output beams are spatially distinct. As a result, the output beams can be independently adjusted in phase by, for example, a modulation-on-exit surface 220 as shown in Figure 2 or modulation-on-reflection surfaces 305 as shown in Figure 3. There is no teaching or suggestion in Shirasaki of a combination including a collimated input beam which has been modulated with a data signal to produce multiple time-delayed output beams, as in the present invention.

In clear contrast to the invention defined by claim 1, Shirasaki discloses (at column 5, lines 19-20 and Figure 6) a line focused input 78 to a "thin plate of glass." This results in beams that are diverging, not collimated. These diverging beams are clearly shown in Figures 8, 9, and 10 of Shirasaki. These Figures clearly show that the beams are diverging and substantially overlapping at the front and back surfaces 122, 124 of the "thin plate of glass." The divergence is identified by the increasing size and overlap of OUT 0, OUT 1, ... OUT 4 in Figure 8. This overlap specifically prevents the Shirasaki device from being usable as an OCDMA processor, in contrast to the present invention.

There is a disclosure in Shirasaki of collimating lenses 322a and 322b in Figures 16 and 17. However, these collimating lenses are immediately followed by a cylindrical lens 324. Cylindrical lens 324 de-collimates the beam in the plane of the progressive reflections. This results in the beam divergence shown in Figures 8, 9, and 10. Therefore, the input to Shirasaki's "thin glass plate" is a diverging beam, not a collimated one.

Regarding the rejection of claims 15-20, the Examiner states that Shirasaki teaches that the modulation can be implemented in the spectral domain (e.g. each optical signal is shifted in phase with respect to each adjacent wavelength). However, the Office Action fails to identify a specific section of the Shirasaki reference at which such teaching can be found, and applicants are unable to identify any teaching in Shirasaki that the modulation can be implemented in the spectral domain. It is respectfully submitted that Shirasaki fails to disclose or suggest that the modulation can be implemented in the spectral domain.

Regarding the rejection of claims 21-26, the Examiner states that Shirasaki's structure can be used as an optical equalizer. However, the Office Action fails to identify a specific section of the Shirasaki reference at which such teaching can be found, and applicants are unable to identify any teaching in Shirasaki that the disclosed structure can be used as an optical equalizer. It is respectfully submitted that Shirasaki fails to disclose or suggest that the structure disclosed therein can be used as an optical equalizer.

In summary, claims 1-3, 5-7 and 9-32 are directed to an invention comprising a number of elements in combination. A similar combination is neither disclosed nor suggested in Shirasaki. The rejection of claims 1-3, 5-7 and 9-32 under 102(e) as being anticipated by Shirasaki is respectfully traversed.

Claims 4 and 8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki. This rejection is respectfully traversed.

Claim 4 is directed to a system wherein the optical tapped delay device includes an etched plate having an etch depth sufficient to produce a desired phase shift through the time delayed output beams. Claim 8 is directed to a system wherein the multiple time-delayed output beams are mutually phase-shifted by an etched pattern on one of the front and back surface of the cavity as a function of the at least one frequency of the input beam.

The Examiner acknowledges that Shirasaki fails to teach that the optical tapped delay device includes an etched plate having an etch depth sufficient to produce a desired phase shift though the time delayed output beams. The Examiner asserts, however, that one skilled in the art would have been motivated to employ an etched plate in the device of Shirasaki in order to produce a more pronounced phase shift in the signals output from the device. Therefore, according to the Examiner, it would have been obvious to one skilled in the art at the time the invention was made to employ an etched plate in the device of Shirasaki.

This rejection is based upon an incorrect premise. The rejection assumes that the output beams in Shirasaki are spatially distinct and can be independently adjusted in phase. This assumption is not correct. As discussed above with respect to the 102(e) rejection, Shirasaki discloses beams that are diverging, not collimated. These diverging beams are clearly shown in Figures 8, 9, and 10 of Shirasaki, and the divergence is identified by the increasing size and overlap of OUT 0, OUT 1, ... OUT 4 in Figure 8. This overlap prevents the Shirasaki device from being usable as an OCDMA processor. If an etched plate was combined with the Shirasaki device as proposed, the diverging beams in Shirasaki would overlap the various phase regions of the etched plate and, thus, not have the required effect. Consequently, there is no motivation for one skilled in the art to use an etched plate in Shirasaki. Moreover, even if an etched plate could be combined with Shirasaki as proposed, the combination would not produce the results produce by the present invention. The overlap that occurs in Shirasaki prevents the Shirasaki device from being usable as an OCDMA processor.

In summary, claims 4 and 8 are directed to an invention comprising a number of elements in combination. A similar combination is neither disclosed nor suggested in Shirasaki. The rejection of claims 4 and 8 under 103(a) as being unpatentable over Shirasaki is respectfully traversed.

Claims 33-38 were rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki in view of Ranalli (USP 6,285,500). This rejection is respectfully traversed.

Representative claim 33 is directed to a receiving system comprising a number of elements in combination. The claimed combination includes a second input beam which projects at an angle to a plane of the optical tapped delay line linear array. Claim 33 requires that the second beam must interfere with each optical tapped delay line beam.

The Examiner acknowledges that Shirasaki fails to teach a second input beam which projects at an angle to a plane of the optical tapped delay line linear array to interfere with each optical tapped delay line beam. The Examiner relies on Ranalli (Figure 5) as teaching to introduce a second beam to an optical system and allow the beams to interfere with a first set of delayed beams.

It is respectfully submitted that the rejection is premised on an incorrect interpretation of Ranalli. The beams in Ranalli's case are NOT interfered. They are switched. Although they do appear to occupy nearly the same position in space, they are not interfered.

Regarding the rejection of claims 34 and 35, the Examiner implies that references teach that the input beam is a coherent reference (inherent in the use of laser light in both systems). It is respectfully submitted, however, that Ranalli does not address a coherent system. The Examiner implies that the mere use of laser light implies a coherent system. That is not the case. A majority of devices (multiplexers, demultiplexers, switches, etc.) which use laser light are not coherent. A coherent system interferes two laser beams which are either derived from a single source or are otherwise highly stabilized such that the absolute phase of one with respect to the other remains within very tight bounds so that the phase of the difference between the two is small compared to the phase of the signals contained within the beams (i.e., the signals modulated onto the optical carriers).


Regarding the rejection of claim 38, the Examiner states that Ranalli clearly suggests convolution in the mixture of signals produced by the device. However, the Office Action fails to identify a specific section of the Ranalli reference at which such teaching or suggestion can be found, and applicants are unable to identify in Ranalli any teaching or suggestion of convolution in the mixture of signals produced by the device. It is respectfully submitted that Ranalli fails to disclose or suggest convolution in the mixture of signals produced by the device.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 509622000700.

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